

70 Years of Computing at Los Alamos National Laboratory

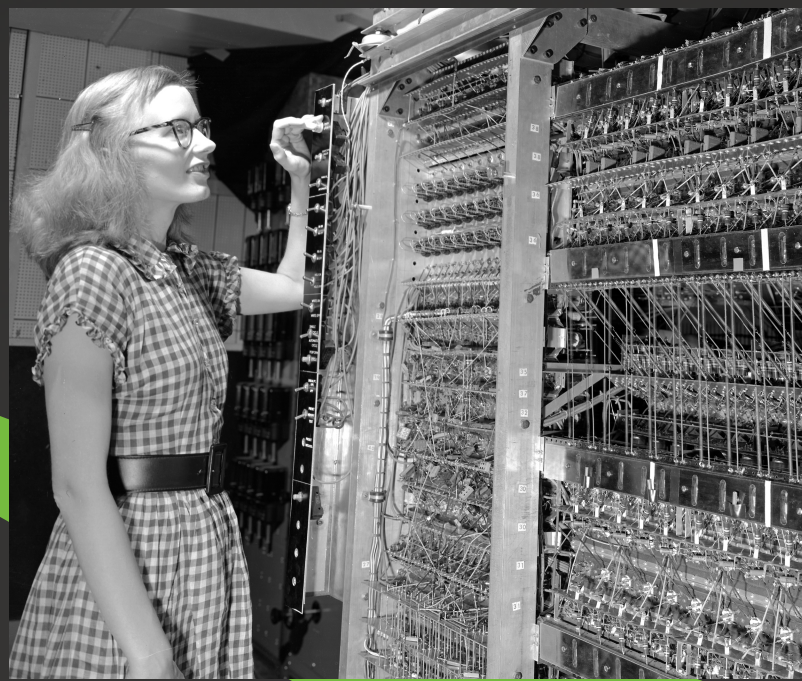
From Day I, Los Alamos (LANL) has used high-performance computing (HPC). Since its inception in 1943, LANL has been a leader in HPC — both in making breakthroughs in every generation of computational technology and in advancing science.

1940s



Bomb calculations at the start of the Manhattan Project, which began in 1943, were done using mechanical calculators and early IBM punched-card tabulators and collators.

1950s



By the early 1950s, the *MANIAC* was used to carry out calculations necessary for

- hydrogen bomb research
- studies of thermodynamics
- simulations using the Monte Carlo method
- attempts to decode DNA

1960s



In the early 1960s *Stretch* was IBM's first computer built of transistors. *Stretch* 35 times more powerful than *Maniac II*.

1970s



In 1976 the *Cray-1* was the Lab's first vector rather than scalar supercomputer. It could perform a single operation on every element in a large set of data without having to read the operation from memory more than once.

1980s



The *Cray X-MP* was unveiled in 1982, as a more tightly engineered version of the *Cray-1* that also possessed two identical processors. The "symmetric multi-processors," or SMP's, represented parallelism on a small scale but foreshadowed the direction of things to come.

1990s



In 1998, Los Alamos and Silicon Graphics unveiled the world's fastest computer. *Blue Mountain* ran the speed test for supercomputers at a fast 1.6 trillion operations per second (teraOps).

2000s



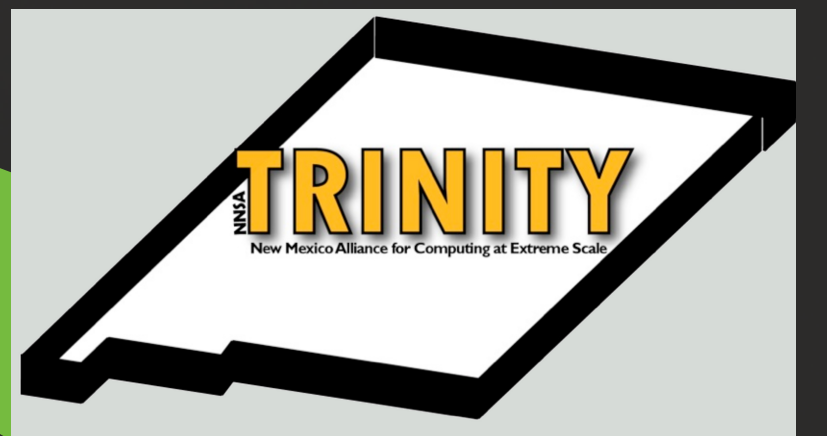
Roadrunner supercomputer made history as the world's most powerful in 2009 when it exceeded a sustained speed of 1 petaflop/s. *Roadrunner* demonstrated to industry that hierarchical architecture is the path forward.

Today



Cielo was a return to the conventional principles of massively parallel computing for Los Alamos. *Cielo* is the fastest supercomputer available at the Laboratory and serves as its main workhorse for scientific computing.

Future



Future supercomputers will improve assessment of the nuclear stockpile. With the new *Trinity* supercomputer, our goal is to provide the supercomputing power for new high-resolution 3D simulations of nuclear weapons. This will allow us to better assess the health of the weapons in the U.S. nuclear deterrent.

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